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a large number of polyoses. It elaborates various enzymes corresponding to each of these sugars; thus the mycelium thriving on glucose contains sucrase, maltase, etc. A given polyose, therefore, is not indispensable.

The sugar enzymes of *Botrytis cinerea* present two distinct types, based upon diffusibility: the invertase type, perfectly diffusible, and the maltase type, strongly adhering to the pulp. The invertase type includes those enzymes which effect the partial hydrolysis of raffinose, melezitose, gentianose, and stachyose. It is necessary to add emulsin for complete inversion. The enzymes analogous to maltase are lactase, trehalase, melibiase, and in general, those which achieve the complete inversion of trisaccharides and manniotetrose. The cultures may thus be divided into two corresponding types. The invertase type is characterized by the presence of both the hydrolytic products and the corresponding enzyme in the culture liquid. The maltase type is characterized by the absence of enzyme and hydrolytic products in the liquid. It is necessary to powder the mycelium in order to demonstrate the presence of the enzymes of this type. The type of culture on maltase is very much more general in the case of *Botrytis cinerea*. The cultures on trisaccharides show successively both of the above aspects.

The author draws the following conclusions regarding the specificity of the sugar enzymes of *Botrytis cinerea*: invertase acts as a levulo-polyose, in respect to sucrose, raffinose, gentianose, and stachyose; it produces levulose from each of these sugars either by total or partial hydrolysis; he was unable to characterize a melezitase different from invertase; maltase and lactase are two distinct enzymes; the hydrolysis of trehalose is brought about by an enzyme closely related to maltase; emulsin effects the hydrolysis of gentiobiose; melibiase is clearly distinguished from emulsin, the author being unable to separate it from lactose; it was impossible to identify turanase and manninotriase with emulsin; from the evidence furnished by *Botrytis cinerea* there is no reason to distinguish them from maltase or lactase.—CHAS. O. APPLEMAN.

Permeability.—In continuing his studies upon modified permeability, CZAPEK¹⁰ reports some most interesting results on the relation between surface tension and modified permeability as brought about by certain aqueous solutions. Various workers have shown a marked agreement between the surface tension and the physiological effect of aqueous solutions of certain non-electrolytes. Passing up the series of mono-alcohols, each succeeding member is (on mol. basis) about three times as effective as the member below it in reducing surface tension of an aqueous solution and in producing certain physiological effects. FÜHNER and NEWBAUER¹¹ have shown for the mono-alcohols, esters, and urethanes that aqueous solutions of equal surface tension produce equal

¹⁰ CZAPEK, F., Ueber die Oberflächenspannung und den Lipoid gehalt der Plasmahaut in lebender Pflanzenzellen. Ber. Deutsch. Bot. Gesell. **28**:480-487. 1910.

¹¹ Archiv. Exp. Path. u. Pharm. **56**:333-345. 1910.

hemolytic effects. LOEB has shown that for the mono-alcohols the same law holds for induced positive heliotropism and for toxic effects in Copepida and Daphniidae.

CZAPEK describes a piece of apparatus by which one can determine quickly the surface tension of a solution. He studied the effects of alcohols (primary, secondary, and tertiary), esters, and urethanes upon the permeability of plant cells to certain solutes such as tannins and anthocyanins. Any aqueous solutions of these substances having a surface tension of 0.68 or 0.69 or less (water considered as unity) rendered the plant cells permeable to the contained solutes. The material studied was leaf cells of *Echeveria*, petiole hairs of *Saxifraga sarmentosa*, petals of *Paeonia*, leaf epidermis of *Tradescantia*, etc. CZAPEK believes that the surface tension of the *Plasmahaut* of the cells used is a little more than 0.68 or 0.69, and that as soon as the surface tension of the surrounding solution is somewhat lower, the solutes in the cell begin to pass out. By this means, he states, the surface tension of the *Plasmahaut* can be measured, just as osmotic pressure can be measured, by the use of the ordinary plasmolytic agents. He believes that the *Plasmahaut* is an emulsion of neutral fats. An aqueous emulsion of fats gives a surface tension of 0.68 or 0.69. Lecithin and cholesterin give lower surface tensions and are assumed not to play any rôle in the *Plasmahauten* studied.

CZAPEK emphasizes the fact that permeability is often modified by agents that lower the surface tension but slightly if any, as weak solutions of acids, chloroform, chloral hydrate, etc. This cannot be explained, of course, on the basis of lowered surface tension of the solution. He believes that in the case of acids it is due to the saponifying action of the acid on the fat of the *Plasmahaut*.

On the whole, the article confirms TRAUBE's surface tension theory of osmotic movements of solutions through plant and animal membranes. This theory assumes that the movement of the solutions is in the direction of the lower surface tension.—WILLIAM CROCKER.

Alternative inheritance in elm seedlings.—There are two species of elm in England, *Ulmus montana* and *U. glabra*, both called "Wych-elm," and numerous cultivated varieties of unknown origin which are planted about English hedgerows and parks. Several of these latter are so distinct as to have received specific names, but HENRY¹² finds, as the result of sowing 90 different lots of elm seeds in 1909, that only the two species above named breed true. The seedlings of *Ulmus glabra* have a stiff, erect, unbranched stem with small leaves which are opposite throughout the first season's growth; while *U. montana* has the unbranched stem drooping to one side and only its first two leaves opposite, the rest alternate, the leaves being larger and with longer petioles. All the cultivated varieties of elm tested gave mixtures of seedlings

¹² HENRY, AUGUSTINE, On elm-seedlings showing Mendelian results. Jour. Linn. Soc. Bot. 39: 290-300. pls. 5. 1910.